

## Performance of the LHCb Outer Tracker in Run-I and Run-II of the LHC

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The LHCb experiment is designed to study B-decays at the LHC, and as such is constructed as a forward spectrometer. The large particle density in the forward region poses extreme challenges to the subdetectors, in terms of hit occupancies and radiation tolerance.

To accurately and efficiently detect the charged decay particles in the high-density particle environment of the LHC the Outer Tracker (OT) has been constructed. The OT is a gaseous straw tube detector, consisting of 53,760 straw tubes, covering an area of 360 m<sup>2</sup> of double layers.

The performance of the OT during run I and run II of the LHC from 2010 to 2018 will be presented. Two independent and complementary methods have been used to measure the radiation resistance of this gas detector in the forward region at the LHC. One method uses a dedicated setup in situ, with which a <sup>90</sup>Sr source is scanned over the surface of part of the OT detector. The second method utilizes reconstructed tracks during LHC operation, with which the hit efficiency over the full detector surface is determined at increased amplifier threshold. In addition, the final performance in terms of hit resolution and hit efficiency will be presented.

### References:

- [1] D. van Eijk, N. Tuning, et al.,  
“Radiation hardness of the LHCb Outer Tracker”,  
Nucl. Instrum. Meth. A685, 62-69, 2012.
- [2] R. Arink et al. [LHCb OT Group],  
“Performance of the LHCb Outer Tracker”,  
JINST 9 (2014) P01002 [arXiv:1311.3893 [physics.ins-det]].
- [3] Ph. d’Argent et al. [LHCb OT Group],  
“Improved performance of the LHCb Outer Tracker in LHC Run 2”,  
JINST 12 (2017) P11016 [arXiv:1708.00819 [hep-ex]]

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